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Credibility and Reliability of Government Budgets: Does Fiscal Transparency Matter?

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Abstract

This paper explores the role of fiscal transparency in affecting budget credibility and reliability, paying particular attention to its effect on budget execution and on the quality of macroeconomic assumptions upon which the budget is based. Using a Principal-Agent approach we argue that fiscal transparency reduces the agent's informational advantage and constrains the agent to execute the contract (Enacted Budget) on behalf of the principal (Voters/Parliament) as intended. An Ordered Logit model is used to test this hypothesis and our findings support that fiscal transparency increases the likelihood of having a credible and reliable budget: improved transparency is associated with higher budget execution rates in the health and the education sectors, and better projections of GDP growth and inflation. These results are robust to a range of econometric specifications, especially after controlling for the potential endogeneity of fiscal transparency.

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1 Introduction

Against the backdrop of heightened realization that economic development and the fight against poverty can effectively be enhanced under an environment of good governance, a sharp focus is now on fiscal transparency. Indeed many governments around the world are embracing the transparency movement by disclosing increasingly more budget information to their citizens, emphasizing how public funds are collected and spent. From the academic viewpoint there is a growing literature providing evidence of the positive impact of fiscal transparency on economic performance. This growing international focus on transparency is also demonstrated by the proliferation in recent years of initiatives aimed at directly and indirectly promoting and enforcing transparency practices. These include the United Nations *Convention Against Corruption*, the International Monetary Fund's *Fiscal Transparency Code,* the Organization for Economic Cooperation and Development's *Best Practices for Budget Transparency*, and the International Budget Partnership's *Open Budget Survey*.

Kopits and Craig define fiscal transparency as "openness toward the public at large about government structure and functions, fiscal policy intentions, public sector accounts, and projections. It involves ready access to reliable, comprehensive, timely, understandable, and internationally comparable information on government activities (…)".[2] The opinion of Premchand is that fiscal transparency reflects a system of well-organized windows on public policy making and policy implementation; it is a means to contributing to effective and comprehensive accountability from government officials.[3] Lack of fiscal transparency and

[2] Kopits, G., & Craig, J. (1998). Transparency in government operations. IMF Occasional Papers No. 158, Washington DC: International Monetary Fund.

[3] Premchand, A. (2001). Fiscal transparency and accountability: idea and reality. Paper prepared for the workshop on Financial Management and Accountability, Rome.

accountability in governance means rules are not enforced and budgets are isolated from citizens' participation.[4]

It's widely recognized in the literature that transparency in government operations is an important precondition for macroeconomic sustainability, good governance and overall fiscal rectitude. For instance, Cebotari et al. argue that fiscal transparency play a significant role in the management of fiscal risks, defined as the differences between a government's forecast and actual fiscal position.[5] More frequent and timely public reporting of fiscal developments can help ensure that fiscal forecasts are based on the most up-to-date understanding of the current fiscal position and facilitate rapid policy responses to shocks. Hameed, and Dabla-Norris et al. find that more transparent developing countries have better credit ratings and greater fiscal discipline.[6] [7] Arbatli and Escolano take this further by decomposing the relationship between transparency and credit ratings into the direct impact (reducing current uncertainty over the fiscal position) and the indirect impact (improving primary balance and gross debt over time), finding that the former dominates in developing countries, while the latter dominates in advanced economies.[8] Alt and Lassen find that a greater fiscal transparency is associated with lower public debt and deficits.[9] This is supported by our recent paper that shows that differences in fiscal transparency practices are the main determinants of the fiscal performance gaps between Anglophone and Francophone Africa.[10]

[4] Campos, E., & Pradhan, S. (1996). Budgetary institutions and expenditure outcomes: binding governments to fiscal performance. Policy Research Working Paper No. 1646, Washington DC: World Bank.

[5] Cebotari, A., Davis, J., Lusinyan, L., Mati, A., Mauro, P., Petrie, M., & Velloso, R. (2008). *Fiscal risks: sources, disclosure, and management*. Washington DC: International Monetary Fund.

[6] Hameed, F. (2005). Fiscal transparency and economic outcomes. IMF Working Paper No. 05/225, Washington DC: International Monetary Fund.

[7] Dabla-Norris, E., Allen, R., Zanna, L-F., Prakash, T., Kvintradze, E., Lledo, V., Yackovlev, I., Gollwitzer, S. (2010). Budget institutions and fiscal performance in low income countries. IMF Working Paper No. 10/80, Washington DC: International Monetary Fund.

[8] Arbatli, E., & Escolano, J. (2012). Fiscal transparency, fiscal performance and credit ratings. IMF Working Paper No. 12/156, Washington DC: International Monetary Fund.

[9] Alt, J.E., & Lassen, D.D. (2006). Fiscal transparency, political parties, and debt in OECD Countries. European Economic Review, 50 (6), 1401-1439.

[10] Sarr, B. (2015). What are the drivers of fiscal performance gaps between Anglophone and Francophone Africa: a Blinder Oaxaca decomposition. South African Journal of Economics, DOI: 10.1111/saje.12084.

However, little has been published about the distribution of budgetary revenue and expenditure deviations around the world, and no study we are aware of has looked at the relationship between fiscal transparency and the credibility and reliability of budgets. Indeed, this type of analysis has been sharply constrained by the availability of data, the endogeneity problem, and the difficulty to identify causal mechanisms. A recent study by Addison has shown that budgets continue to deviate considerably from plans, and this underscores the necessity to identify mechanisms that can improve budget credibility and reliability.[11]

Therefore this paper makes a novel contribution to the existing literature by assessing the impact of fiscal transparency on budget credibility and reliability. Credibility and reliability can refer to the legitimacy of the process by which a budget has been created. They could also refer to the question of whether the allocations within the budget under consideration are technically appropriate to its stated policy goals. Finally, a budget may be considered credible and reliable if the outturns match the approved budgets.[12] This last definition is the one used in this paper to define budget credibility and reliability; in this context, a credible and reliable budget would have no or limited deviation from plan over the budget year.

The remainder of the paper is organized as follows: Section 2 presents a theoretical model on the relationship between transparency and credibility[13], and how they are measured. Section 3 introduces the econometric strategy for inference testing while Sections 4 and 5 present the data characteristics and the results. A discussion of the results and general conclusions are found in Section 6.

[11] Addison, D. (2013). The quality of budget execution and its correlates. World Bank Policy Research Working Paper No. 6657.

[12] Simson, R., & Welham, B. (2014). Incredible budgets: budget credibility in theory and practice. ODI Working Paper No. 400, London: Overseas Development Institute.

13 Budget credibility will be used hereafter as a general term meaning budget credibility and reliability.

2 Why Does Transparency Matter for Credibility?

2.1 A Principal – Agent approach

From its origins in the new economics of organization as a theoretical construct devised to examine relations within the firm, the principal-agent model became the dominant framework for examining the difficulties that arise from contracting in any setting (Moe 1984). Agency relationships are created when one party, the principal, enters into a contractual agreement with a second party, the agent, and delegates to the latter responsibility for carrying out a function or set of tasks on the principal's behalf. Difficulties arise on account of the asymmetric distribution of information that favors the agent including adverse selection and moral hazard.[14]

The decision making process in public finance has the character of a principal-agent relationship as the voters delegate the power to elected politicians.[15] [16] The Budget enacted by the Parliament on behalf of the voters, at the beginning of each budget cycle, can be seen as the main element of the contract. As mentioned earlier the agency problem arises from the agent's informational advantage, both on its own actions and on the current state of nature. This information asymmetry is behind various types of budgeting practices that contribute to the mismatch between plans and outturns. These include escapist budgeting that authorizes more spending than the government can mobilize; hidden budgeting, where the real priorities are known only to a narrow group of individuals within government; and deferred budgeting where real spending patterns are obscured by the generation of arrears.[17]

Alesina and Perotti noted that politicians typically do not have an incentive to adopt the most transparent practices.[18] As the principal, the public is therefore entitled to monitor the performance of the agent (the government) and hold the agent accountable for its actions. If the agent knows that the principal cannot adequately monitor the agents' actions, he may feel

[14] Holmstrom, B. (1979). Moral hazard and observability. Bell Journal of Economics, 10, 74- 91.

[15] Kofman, F., & Lawarrée, J. (1993). Collusion in hierarchical agency. Econometrica, 61(3), 629–56.

[16] Kofman, F., & Lawarrée, J. (1996). On the optimality of allowing collusion. Journal of Public Economics, 61(3), 383-407.

[17] Schick, A. (1998). A contemporary approach to public expenditure management. Washington DC: World Bank.

[18] Alesina, A., & Perotti, R. (1996). Budget deficits and budget institutions. IMF Working Paper No. 96/52, Washington DC: International Monetary Fund.

he has a freer hand to behave differently than if the principal were able to monitor. Fiscal transparency can limit this behavior by enhancing an effective oversight over how public resources are allocated and spent and is a powerful disincentive for officials to misuse public funds since their actions are more likely to be scrutinized. If the budget is open to the public and effective legislative scrutiny, there is less room for deviations from policy decisions and reversal of budget allocations because increased transparency enables voters to better understand the budget, and to evaluate the actual performance of the government. The more the public knows about and understands the budget process the less politicians can act strategically and use fiscal deficits and excessive expenditures to achieve opportunistic goals.[19] Fiscal transparency helps to align the interests of the principal and the agent, and makes fiscal discipline and expenditure control easier to achieve.[20] [21]

Besides, a policy of transparency must compel a government to disclose its performance during the whole budget cycle. Partial disclosure does not eliminate the potential for information asymmetries if inconvenient parts of one's performance can be withheld.[22] That disclosures must be truthful as the government cannot be held accountable unless the information available to the public about its performance is accurate. Therefore, what transparency properly understood requires the government to disclose not only its planned actions but also its end-of-the-year performance. Simple disclosure that reveals only inputs is insufficient to address performance-related principal-agent problems, as the government can raise its fiscal transparency level during the formulation stage in order to be perceived as trustworthy by the public who will eventually give them credit for executing the budget as planned.

[19] Benito, B., & Bastida, F. (2009). Budget transparency, fiscal Performance, and political turnout: an international approach. Public Administration Review, 69(3), 403-417.

[20] Stiglitz, J.E. (2002). Information and the change paradigm in economics. The American Economic Review, 460-487.

[21] Alesina, A., & Perotti, R. (1996). Budget deficits and budget institutions. IMF Working Paper No. 96/52, Washington DC: International Monetary Fund.

[22] Penno, M. 1997. Information quality and voluntary disclosure. The Accounting Review, 275-277.

2.2 Measuring Transparency and Credibility

2.2.1 Transparency

Notwithstanding the difficulties in measuring transparency, a number of organizations have developed some objective, rigorous and technical ways of measuring fiscal transparency. These measures include the multi-donor program Public Expenditure and Financial Accountability23 (PEFA) Framework, the International Monetary Fund (IMF) and World Bank's Reports on the Observance of Standards and Codes24 (ROSC), and the International Budget Partnership's Open Budget Survey25 (OBS). Among these assessment tools, the OBS is the only one that regularly assesses fiscal transparency for a large number of countries around the world. Indeed the Open Budget Survey, published biennially since 2006, is increasingly being used by civil society groups, international donor agencies, and academia to measure fiscal transparency and openness. The Survey assesses the content and timely release of eight key budget documents26 that all countries should issue at different points in the budget process, according to international standards on public financial management developed by the IMF, the Organization for Economic Cooperation and Development (OECD), and the World Bank. The survey consists of a questionnaire assessing the comprehensiveness of publicly available budget information (i.e. information such as macroeconomic assumptions, classified estimates of government's revenues and expenditures, estimates of quasi-fiscal and extra-budgetary activities, etc…); the survey results are then aggregated to compute the Open Budget Index (OBI) that is used in this study to measure fiscal transparency.

2.2.2 Credibility

Campos and Pradhan argue that there are three outcomes of expenditure management: overall control within sustainable limits, strategic prioritization of resource allocation, and efficient and cost-effective management of programs.[27] The ability to implement the budgeted expenditure

23 https://www.pefa.org/

24 http://www.worldbank.org/ifa/rosc.html

25 http://internationalbudget.org/what-we-do/open-budget-survey/

26 Pre-budget statement, Executive's budget proposal, Enacted budget, Citizens budget, In-year reports, Mid-year review, Year-end report, and Audit report. The Survey also assesses the strength of oversight institutions and the opportunity for public participation in the budget process.

[27] Campos, E., & Pradhan, S. (1996). Budgetary institutions and expenditure outcomes: binding governments to fiscal performance. Policy Research Working Paper No. 1646, Washington DC: World Bank.

is an important factor in supporting the government's ability to achieve these goals. The PEFA methodology assesses the Credibility of the budget by measuring the actual total expenditure, the composition of expenditures, and the total revenues compared to the originally approved budget, and the stock of arrears (PI-1, PI-2, PI-3, and PI-4). We use the same approach as the PEFA methodology to measure budget credibility, with a focus on the budgeted expenditures for health and education sectors[28], as they represent a significant portion of the budget in most countries and particularly in the developing world. The use of the deviations from planned sectoral budgets will allow us to better capture the government's budget credibility as funds can be reallocated between budget lines during the implementation phase of the budget cycle and that cannot be captured by just looking at the total expenditure deviations. Some care is needed in defining what deviation is to be measured. Many countries approve a budget at the start of a fiscal year and subsequently approve supplemental budgets to make within-year corrections to account for ad-hoc policy changes and various shocks. The fact that such corrections are necessary is however indicative of weaknesses in macroeconomic forecasting and in planning. This paper therefore follows the PEFA methodology, which measures only the deviations between actual outcomes and the original budgets at the start of each year rather than budgets that may have been subsequently modified.

We also assess budget credibility by looking at the accuracy of the macroeconomic assumptions upon which the budget is based. Indeed a realistic and credible medium-term macroeconomic and fiscal forecast is a starting point for the formulation of a credible fiscal strategy. The current PEFA framework does not include a set of indicators measuring the deviations between projected and actual macroeconomic parameters; however the Upgraded PEFA Framework[29], which is now being tested, includes an indicator assessing the credibility of fiscal strategy (PI-14). We therefore use the same approach as above and calculate the deviations from the assumptions made on two critical parameters: the annual growth rate of Gross Domestic Product (GDP) and the level of inflation. Note that budget credibility can also be measured by

[28] The PEFA methodology recommends using administrative budgets wherever possible. If the budget is not presented according to the administrative classification, the functional classification is then used.

[29] The Upgraded PEFA framework is available here: https://www.pefa.org/sites/pefa.org/files/PMF%20Upgrade%20-%20Testing%20Version%2026-01-15.pdf

the deviations from budgeted revenues as per the PEFA methodology but no database providing this information does exist[30]. Besides, previous studies including Talvi and Vegh and Addison found evidence that deviations from budgeted expenditures in developing countries are highly correlated with deviations from projected revenues.[31] [32]

3 Methodology

3.1 The Ordered Logit Model (OLM)

In this section we present the econometric model applied to test the hypotheses presented in the previous section, in a unified framework. Given its qualitative nature, we describe the level of budget credibility using a discrete variable, Y_i. This variable can take one of these three values, depending on the set of indicators used (budget execution or macroeconomic assumptions):

Y_i = 1 (Poor) if the deviation of country i is above 10% (above 1 point for macroeconomic assumptions),

Y_i = 2 (Good) if the deviation of country i is between 5% and 10% (between 0.5 and 1 point for macroeconomic assumptions),

Y_i = 3 (Excellent) if the deviation of country i is below 5% (below 0.5 point for macroeconomic assumptions).

This choice is based on the continuous latent variable Y_i^* (quality of budget execution and quality of macroeconomic forecasts) which is a linear function of a number of economic variables:

[30] Note that this information can be found in the PEFA reports on a case-by-case basis. Furthermore, the exercise performed in this study can also be replicated to assess the impact of fiscal transparency on the quality of revenue estimates.

[31] Talvi, E., & Vegh, C. (2004). Tax base variability and procyclical policy. Working Paper No. 7499, Washington, DC: National Bureau of Economic Research.

[32] Addison, D. (2013). The quality of budget execution and its correlates. World Bank Policy Research Working Paper No. 6657.

$$Y_i^* = X_i\Phi + u_i, \text{ for i = 1, 2, ... N} \quad (1)$$

where X_i is a vector of explanatory variables, Φ the associated vector of coefficients to be estimated, and N is the number of countries. The likelihood of belonging to these categories is defined in terms of probabilities of the values of the underlying latent variable Y_i^*.

We assume that each country belongs to one of the three categories when the latent variable is below or above a certain threshold level c_i, i = 1, 2:

$$Y_i = 1 \text{ if } Y_i^* < c1$$

$$Y_i = 2 \text{ if } c1 < Y_i^* < c2$$

$$Y_i = 3 \text{ if } Y_i^* > c2 \quad (2)$$

The probabilities of Y_i being in one of the three categories is given by:

$$P(Y_i = 1) = P(X_i\Phi + u_i < c1) = F(c1 - X_i\Phi)$$

$$P(Y_i = 2) = P(c1 < X_i\Phi + u_i < c2) = F(c2 - X_i\Phi) - F(c1 - X_i\Phi)$$

$$P(Y_i = 3) = P(X_i\Phi + u_i > c2) = 1 - F(c2 - X_i\Phi) \quad (3)$$

where F(x) = P (u_i < x) is the cumulative probability distribution of the error term. We can assume here that the error term follows the logistic or normal distribution. Because the information criterion (Akaike 1974) does not indicate clearly the superior model (Probit or Logit) for our data set, we assume the error term u_i, to be independent and identically

distributed with a logistic distribution function with a mean of 0 and variance of $\frac{\pi 2}{3}$. The probabilities of Y_i taking values 1, 2 or 3 are given by:[33]

$$P(Y_i = 1) = P(c1 - X_i\Phi) = \frac{1}{1+\exp(X_i\Phi - c1)}$$

$$P(Y_i = 2) = P(c2 - X_i\Phi) - P(c1 - X_i\Phi) = \frac{1}{1+\exp(X_i\Phi - c2)} - \frac{1}{1+\exp(X_i\Phi - c1)}$$

$$P(Y_i = 3) = 1 - P(c2 - X_i\Phi) = 1 - \frac{1}{1+\exp(X_i\Phi - c2)} \quad (4)$$

3.2 Control Variables

In order to assess the impact of fiscal transparency on budget credibility we need to identify the other factors that may influence a country's budget credibility. As no previous study we are aware of has investigated the linkages between transparency and credibility we rely on the current literature on fiscal transparency and fiscal performance to select our control variables.

The level of GDP per capita is expected to be positively correlated with budget credibility as the more developed a country is, the more likely it will have the adequate human resources and public expenditure management to best plan, execute, and monitor its budget. Previous studies in the relevant literature such as Alt and Lassen and Hameed also controlled for the level of development when studying the relationship between fiscal transparency and fiscal performance.[34] [35] The level of democracy, proxied by the Polity 2 score, and the strength of the Legislature can be expected to improve budget credibility, as the more empowered the Parliament is to scrutinize the Executive's actions, the more likely the Executive will observe budget rules and controls. The quality of public and civil services and the degree of their independence from political pressures can also be expected to have a significant impact on the

[33] Akaike, H. (1974). A new look at the statistical model identification. IEEE Transactions on Automatic Control, AC-19, 716-723.

[34] Alt, J.E., & Lassen, D.D. (2003). Fiscal transparency and fiscal policy outcomes in OECD Countries. Economic Policy Research Unit Working Paper No. 2003-2, Paris: OECD.

[35] Hameed, F. (2005). Fiscal transparency and economic outcomes. IMF Working Paper No. 05/225, Washington DC: International Monetary Fund.

formulation and on the implementation of the budget, and are proxied by the Government Effectiveness Index. We also include in our analysis the level of Centralization of the budget process as von Hagen showed that a centralized system, which allows little room for change during the budget process is more conducive to lower deficits and debts.[36] The size of the population is also controlled for as Hameed found this variable to be positively correlated with fiscal performance.[37] Finally, we include countries' dependency to oil and foreign aid as the volatility of these revenue sources can be expected to affect the way in which the budget is implemented. Previous studies have notably highlighted that oil exporters have poorer economic performance than non-oil exporters due to the harmful influence of oil wealth on governance and on the real exchange rate for the rest of the domestic economy (the Dutch disease).

4 Empirical Analysis

4.1 Data

Our sample consists of 73 developed and developing countries. As mentioned earlier, we measure transparency by countries' OBI score taken from the 2012 Open Budget Survey. The proxies for budget credibility, i.e. deviations from budgeted health and education expenditures (expressed as percentages) and deviations from projected GDP growth and inflation (expressed in percentage points) are taken from countries' 2012 and 2013 Year-End-Reports. In fact according to the 2015 Open Budget Survey, 73 of the 102 countries surveyed publish this document; this explains why our sample is limited to 73 countries. Most countries do not provide comprehensive information comparing budgeted versus actual macroeconomic parameters. Therefore additional information has been taken from the World Bank World Development Indicators (WDI) and countries' Executive Budget Proposals to complete our database. The WDI databank is the principal information source for the other variables used in this study including GDP per capita, Population, Oil rents, and Official Development Assistance

[36] Von Hagen, J. 1992). Budgeting procedures and fiscal performance in the European Communities. Economic Paper No. 96, Hague: European Commission.

[37] Hameed, F. (2005). Fiscal transparency and economic outcomes. IMF Working Paper No. 05/225, Washington DC: International Monetary Fund.

(ODA). Information on the Strength of the Legislature is provided by the 2012 Open Budget Survey, which also assesses the strength of oversight institutions during the budget process. Information on Government Effectiveness and Democracy is taken from the Worldwide Governance Indicators and the Polity IV Project respectively. The level of Centralization of the budget process is proxied by the form of government of the country and this information is taken from the Database of Political Institutions (DPI). A complete description of the variables and their sources can be found in Appendix A.

4.2 Summary statistics

Before we turn to the regression analysis, we first want to investigate how countries' characteristics and budget credibility differ according to their state of fiscal transparency. Table 1 presents the descriptive statistics of countries clustered into five different categories, ranging from countries making publicly available scant or no information during the budget process to countries providing extensive budget information to the public[38]. The preliminary findings show that, on one hand, the level of GDP per capita, the strength of the legislature, government effectiveness, and the level of democracy are positively correlated with countries' fiscal transparency. On the other hand, countries with higher oil rents and countries where the budget process is highly centralized seem to make less budget information publicly available. The relationship between the amount of aid received by a country and its level of fiscal transparency appears to be ambiguous.

If we now look at the statistics on the credibility of the budget, the preliminary results show a negative correlation between the degree of fiscal transparency during the budget process and the magnitude of the deviations from projected GDP growth and inflation level. However this correlation should be nuanced as the average deviation of projected GDP growth for countries in the "minimal information" category is relatively low compared to the rest of countries; the same observation can be made for the average deviation from projected inflation level for countries in the "scant information" category. For the deviations from budgeted expenditures

[38] The Open Budget Survey classifies countries into these 5 categories according to their OBI score. The categorization is as follows: Score 0-20 (Scant or no information), Score 21-40 (Minimal information), Score 41-60 (Some information), Score 61-80 (Significant information), and Score 81-100 (Extensive information).

in health and education, the overall correlation with the level of transparency is also negative meaning that countries with higher deviations from planned expenditures seem to be less transparent. These statistics are corroborated by the graphical representations in Appendix B.

Table 1: Summary statistics

	Information provided to the public					
	Scant	Minimal	Some	Significant	Extensive	Total
GDP per capita	1557.28	4342.7	4123.79	15511.24	36824.3	9074.8
Population	37.5	10.5	28.2	80.7	33.5	40.5
Government Effectiveness	-0.63	-0.25	-0.26	0.63	1.47	0.01
Polity 2 score	-1.72	2.28	4.59	7.43	9	4.38
Centralization	0.92	0.42	0.55	0.5	0.17	0.56
Legislature Strength	41.61	46.28	54.41	66.1	77	55.81
Oil rents (%GDP)	8.34	4.42	3.24	1.84	1.85	3.77
ODA (%GNI)	3.36	2.77	4.15	1.72	0.28	3.46
Δ GDP growth	-0.98	-0.58	-0.79	-0.48	-0.35	-0.61
Δ Inflation	-0.44	-1.13	-0.77	-0.69	-0.32	-0.67
Δ Education	-12.92	-10.71	-7.89	-4.5	-1.55	-7.93
Δ Health	-10.67	-7.28	-8.14	-5	-2.46	-6.15

Source: Author's calculations. "Δ" stands for deviations from plans/projections.

4.3 Results

Table 2 shows the results from the OLM regressions in equation (4) with the deviations from budgeted expenditures in health and education as the dependent variables. For both health and education sectors, fiscal transparency is an important positive determinant of the quality of budget execution[39] ; the coefficients associated with fiscal transparency are significant at 5% level. The coefficients of the control variables display the expected impacts on the probability to execute the budget as intended: the level of economic development and the other variables

[39] Note that the baseline category is « poor execution/projection ».

measuring the quality of institutions have a positive impact on budget credibility, while oil and aid dependencies are more likely to increase deviations from planned expenditures. The centralization of the budget process, which is associated with better fiscal performance in the literature, seems here to be associated with lower budget credibility.

Table 2: Fiscal Transparency and Budget Execution

	(1) Δ Education	(2) Δ Health
Transparency	0.117** (0.0507)	0.0956** (0.0450)
GDP per capita	0.126** (0.0528)	0.077* (0.039)
Population	0.067* (0.04)	0.048 (0.041)
Government Effectiveness	4.707** (2.124)	2.567* (1.540)
Polity 2 score	0.633** (0.319)	0.765*** (0.278)
Legislature Strength	0.056** (0.016)	0.051** (0.014)
Centralization	-3.265** (1.381)	-3.24** (0.974)
ODA	-0.764* (0.418)	-0.258 (0.342)
Oil Rents	-0.239** (0.0998)	-0.137* (0.0535)
Log Likelihood	-17.78	-13.37
Pseudo R2	0.58	0.69
N	73	73

Standard errors in parentheses, *, **, and *** imply significance at 10, 5, and 1% respectively.

In Table 3 we run the same model with the gaps between projected and actual GDP growth and inflation rates as dependent variables. Here again fiscal transparency appears to significantly increase the probability of having accurate macroeconomic assumptions; the coefficients

associated with fiscal transparency are significant at 5 and 10% for GDP growth and inflation respectively. The impact of the level of economic development and other institutional strength variables are positive and significant, excepted for the strength of the Legislature and the level of centralization of the budget process, which turn out to be insignificant. The impact of aid dependency is not significant in contrast to the results presented in Table 2.

Table 3: Fiscal Transparency and quality of Macroeconomic Assumptions

	(1) Δ GDP growth	(2) Δ Inflation
Transparency	0.242**	0.211*
	(0.108)	(0.120)
GDP per capita	0.088*	0.085*
	(0.038)	(0.032)
Population	0.103*	0.21*
	(0.047)	(0.09)
Government Effectiveness	2.938**	2.462***
	(0.804)	(0.35)
Polity 2 score	1.241**	1.154*
	(0.519)	(0.631)
Legislature Strength	0.0320	0.101
	(0.0470)	(0.0829)
Centralization	-3.303	-2.553
	(2.33)	(1.789)
ODA	-0.430	-0.873
	(0.641)	(0.608)
Oil Rents	-0.186*	-0.325*
	(0.105)	(0.184)
Log Likelihood	-18.61	-20.9
Pseudo R2	0.44	0.45
N	60	60

Standard errors in parentheses, *, **, and *** imply significance at 10, 5, and 1% respectively.

4.4 Disaggregating the impact of fiscal transparency

As shown above, fiscal transparency increases the probability of having a credible and reliable budget. To deepen our analysis we disaggregate the OBI score, measuring fiscal transparency during the whole budget process, into two sub-scores: the OBI score during the formulation phase and the OBI score during the execution and reporting phase. This decomposition of fiscal transparency during the budget process might display insightful information as we showed in our principal-agent approach earlier because the Executive can behave strategically by being transparent only during the formulation phase or during the implementation phase. Moreover, we also investigate how the evolution of the Executive's transparency behavior between the two phases affects the credibility of the budget. The results summarized in Table 4 and Table 5 confirm our previous findings, as both fiscal transparency during the formulation phase and fiscal transparency during the implementation of the budget increase the probability of having a credible budget. In Table 4 it's found that fiscal transparency during the formulation phase has a higher impact on the probability to implement the budget as planned as the coefficients associated with this variable are slightly higher than those associated with fiscal transparency during the execution phase. Note that in Table 5 fiscal transparency during execution doesn't appear to be a significant determinant of the quality of inflation level projections.

If we now look at the coefficients associated with Dynamic Transparency, which measures the magnitude of the variations of the level of transparency between the two phases, the results show that the larger the transparency gap between the execution and the formulation phases, the higher the probability of having a credible budget. This finding confirms that governments that are transparent during the formulation phase but do not publish information on how the budget is executed are more likely to make overly optimistic macroeconomic assumptions and to poorly execute their budgets.

Table 4: Disaggregated impact of Fiscal Transparency on Budget Execution

	(1)	(2)	(3)	(4)	(5)	(6)

	Δ Education			Δ Health		
Transparency Formulation	0.116**			0.16**		
	(0.049)			(0.061)		
Transparency Execution		0.0858*			0.086*	
		(0.0476)			(0.051)	
Dynamic Transparency			0.24*			0.18*
			(0.112)			(0.094)
GDP per capita	0.13***	0.11**	0.09**	0.09*	0.06*	0.058*
	(0.04)	(0.04)	(0.03)	(0.05)	(0.03)	(0.02)
Population	0.06*	0.044*	0.058*	0.17**	0.15*	0.11*
	(0.03)	(0.02)	(0.03)	(0.07)	(0.08)	(0.05)
Government Effectiveness	6.07***	4.386**	4.212**	2.375**	2.825*	2.79*
	(2.286)	(1.710)	(1.789)	(0.98)	(1.491)	(1.37)
Polity 2 score	0.43**	0.67**	0.686**	1.185***	1.542***	1.591***
	(0.193)	(0.286)	(0.293)	(0.154)	(0.490)	(0.156)
Legislature Strength	0.028*	0.053*	0.048*	0.13*	0.096**	0.128*
	(0.014)	(0.0257)	(0.026)	(0.05)	(0.044)	(0.05)
Centralization	-3.54***	-3.331***	-3.204***	-2.07**	-2.47***	-2.53*
	(1.263)	(1.187)	(1.155)	(1.03)	(0.26)	(1.187)
ODA	-0.573	-0.907**	-0.555	-0.639	-0.629	-1.71*
	(0.397)	(0.433)	(0.378)	(0.577)	(0.488)	(1.023)
Oil Rents	-0.221**	-0.191**	-0.196**	-0.18*	-0.141	-0.22*
	(0.0931)	(0.0812)	(0.0847)	(0.147)	(0.108)	(0.133)
Log Likelihood	-17.67	-19.75	-21.26	-10.23	-14.68	-10.94
Pseudo R2	0.59	0.54	0.5	0.76	0.66	0.74
N	73	73	73	73	73	73

Standard errors in parentheses, *, **, and *** imply significance at 10, 5, and 1% respectively.

Table 5: Disaggregated impact of Fiscal Transparency on the quality of Macroeconomic Assumptions

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ GDP growth			Δ Inflation		
Transparency Formulation	0.105**			0.124**		
	(0.0431)			(0.0498)		
Transparency Execution		0.113**			0.0605	
		(0.0509)			(0.0401)	
Dynamic Transparency			0.19*			0.172**

			(0.09)			(0.05)
GDP per capita	0.13***	0.09**	0.09*	0.086**	0.077**	0.091*
	(0.035)	(0.03)	(0.05)	(0.035)	(0.033)	(0.05)
Population	0.09**	0.144*	0.11**	0.22**	0.18*	0.21***
	(0.035)	(0.069)	(0.03)	(0.07)	(0.08)	(0.05)
Government Effectiveness	1.55**	1.67**	1.92**	1.706*	1.674*	1.864*
	(0.34)	(0.309)	(0.281)	(0.523)	(0.46)	(0.74)
Polity 2 score	1.16**	1.33**	1.431**	1.11*	1.332*	1.31*
	(0.235)	(0.231)	(0.226)	(0.33)	(0.57)	(0.48)
Legislature Strength	0.039	0.017	0.069	0.018	0.025	0.019
	(0.036)	(0.033)	(0.029)	(0.035)	(0.03)	(0.027)
Centralization	-2.61	-1.74	-1.44	-1.75	-1.52	-1.234
	(1.46)	(1.05)	(0.964)	(1.162)	(0.944)	(0.986)
ODA	-0.012	-0.208	-0.134	-0.341	-0.105	-0.174
	(0.375)	(0.400)	(0.356)	(0.382)	(0.341)	(0.360)
Oil Rents	-0.033*	-0.015*	-0.026*	-0.03*	-0.041*	-0.051**
	(0.017)	(0.006)	(0.01)	(0.016)	(0.02)	(0.024)
Log Likelihood	-16.39	-16.73	-20.46	-17.05	-20.9	-21.39
Pseudo R2	0.42	0.41	0.38	0.46	0.35	0.33
N	60	60	60	60	60	60

Standard errors in parentheses, *, **, and *** imply significance at 10, 5, and 1% respectively.

5 Robustness Checks

5.1 Instrumentation

The first robustness test we perform is related to the potential endogeneity of fiscal transparency. Indeed a potential reverse causality may exist between fiscal transparency and budget credibility. Moreover governments that have better budget execution and accurate macroeconomic assumptions could be more likely to establish transparent practices. Enhancements in fiscal transparency can also be part of a larger package of public financial management reforms.

In the literature, two instrumental variables-based approaches to correct for endogeneity in non-linear models are used. The first one is the two-stage residual inclusion (2SRI) and the

second one is the two-stage predictor substitution (2SPS). 2SPS is very similar to the linear two-stages least squares estimator. In the first-stage of 2SPS, reduced form regressions are estimated and the results are used to generate predicted values for the endogenous variables. In the second-stage, the endogenous variables are replaced by their predicted values obtained from the first-stage. The 2SRI estimator has the same first stage as 2SPS, but in the second stage the endogenous variables are not replaced by their predicted values. Instead, the first-stage residuals are included in the second stage, controlling for the component of the error term that is correlated with the endogenous explanatory variables, and thereby correcting for endogeneity. Following the suggestion of Terza et al.[40] we use the 2SRI technique.[41]

To properly instrument fiscal transparency we need to find variables that must satisfy the following conditions: first, they need to be sufficiently correlated with the endogenous variable; and, second, they can neither have a direct impact on the dependent variable, nor be correlated with the error term. Also, there must be at least as many instruments as there are endogenous regressors. We consider as an instrument for fiscal transparency, the development of citizens' access to Information and Communication Technologies (ICTs) proxied by number of Internet users per country. Our hypothesis is that the number of Internet users is positively correlated with the degree of fiscal transparency, as one would expect the development of ICTs to raise public awareness and demand for openness and then increase the willingness of governments to publish more budget information.

From our first stage estimation in the first column of Table 6, we can see that the estimated coefficient of our instrument is positive and statistically significant. The second requirement for a valid instrument is that it can neither have a direct influence on the dependent variable, nor be correlated with the error term. In our case, we think that the number of Internet users in a country cannot be suspected to have a direct impact on government budget's credibility. However in order to statistically test for correlation of our instrument with the error term, an over-identifying restrictions test has been performed. This test is a likelihood ratio test that

[40] Terza et al. (2008) support the use of 2SRI, showing that 2SRI is generally statistically consistent in the broader class of non-linear model.

[41] Terza, J., Basu, A., & Rathouz, P. (2008). A two-stage residual inclusion estimation: addressing endogeneity in health econometric modeling. Journal of Health Economics, 27, 531-543.

compares the likelihood function of the two-stage estimates with the likelihood function of a specification, which additionally includes our instrument. This test confirms the validity of our instrument.

The results presented in columns 2 to 5 of Table 6 confirm our previous findings, since the coefficients associated with fiscal transparency are positive and statistically significant, and the impacts are even higher compared to the previous results presented in Tables 2 and 3.

Table 6: Two-Stages Residual Inclusion regressions

	(1) Transparency	(2) Δ Education	(3) Δ Health	(4) Δ GDP growth	(5) Δ Inflation
Internet users	0.301**				
	(0.11)				
Transparency		0.146**	0.13***	0.32**	0.28**
		(0.06)	(0.03)	(0.14)	(0.13)
GDP per capita	0.012*	0.18***	0.15***	0.105**	0.072*
	(0.005)	(0.067)	(0.032)	(0.038)	(0.041)
Population	0.101	0.06*	0.039*	0.11*	0.26*
	(0.108)	(0.034)	(0.016)	(0.04)	(0.11)
Government Effectiveness	3.262	5.023**	4.35*	3.10**	3.93**
	(5.776)	(2.299)	(2.811)	(1.328)	(1.284)
Polity 2 score	1.704**	0.57**	1.265**	1.94**	1.94**
	(0.725)	(0.224)	(0.436)	(0.783)	(0.765)
Legislature Strength	0.143	0.051**	0.044**	0.051	0.046
	(0.148)	(0.01)	(0.009)	(0.066)	(0.059)
Centralization	-7.136*	-5.54**	-5.42**	-6.276**	-4.890**
	(3.970)	(2.11)	(2.06)	(2.785)	(2.246)
ODA	-0.605	-0.715	-0.448	-0.210	-0.472
	(1.436)	(0.441)	(0.483)	(0.505)	(0.391)
Oil Rents	-0.21	-0.308***	-0.18*	-0.185*	-0.196**
	(0.17)	(0.118)	(0.093)	(0.083)	(0.095)
Intercept/Residual	11.43**	-0.241*	-0.28**	-0.656**	-0.467**
	(4.38)	(0.13)	(0.078)	(0.271)	(0.229)
F Stat/Log Likelihood	12.56	-16.33	-13.32	-12.59	-18.25
Adjusted/Pseudo R2	0.728	0.621	0.695	0.558	0.430
N	71	71	71	60	60
Overid test (p value)		0.231	0.27	0.33	0.292

Standard errors in parentheses, *, **, and *** imply significance at 10, 5, and 1% respectively. Column 1 is the first stage regression with the percentage of Internet users as an instrument for Transparency.

5.2 The Generalized Ordered Logit Model (GOLM)

The second verification we perform is related to the model used in our regressions, which assumes that the coefficients of each predictor are equal among the different categories of the dependent variable; this is known as the proportional odds model or the parallel lines assumption. In Table 7, we re-estimate our model by using a Generalized Ordered Logit Model (GOLM), which is less restrictive and allows the effects of the explanatory variables to vary with the point at which the categories of the dependent variable are dichotomized. The gammas indicate the extent to which the proportional odds assumption is violated by the variable, so when the gammas are not statistically significant the proportional odds assumption is met.[42]

The results show that the parallel lines assumption is valid for all explanatory variables in the model and the variable of interest, i.e. fiscal transparency, remains a positive and significant predictor of budget credibility.

Table 7: Generalized Ordered Logit Model regressions

	Δ Education		Δ Health		Δ GDP growth		Δ Inflation	
	Beta	*Gamma*	Beta	*Gamma*	Beta	*Gamma*	Beta	*Gamma*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Transparency	0.17***	*0.06*	0.112**	*0.03*	0.2**	*-0.08*	0.23***	*-0.09*
	(0.04)	*(0.23)*	(0.038)	*(0.06)*	(0.09)	*(0.05)*	(0.083)	*(0.22)*
GDP per capita	0.133**	*0.005*	0.057**	*0.003*	0.083*	*0.001*	0.073	*0.003*
	(0.05)	*(0.01)*	(0.019)	*(0.006)*	(0.049)	*(0.034)*	(0.05)	*(0.016)*
Population	0.058**	*0.061*	0.027*	*0.065*	0.14**	*0.018*	0.18**	*0.033*
	(0.021)	*(0.89)*	(0.01)	*(1.271)*	(0.06)	*(0.054)*	(0.074)	*(0.02)*
Government Effectiveness	5.48**	*-1.53*	1.98*	*-2.02*	3.83**	*-1.77*	3.49**	*-0.52*
	(2.12)	*(2.77)*	(0.82)	*(3.97)*	(1.07)	*(2.75)*	(1.02)	*(0.32)*
Polity 2 score	1.124*	*0.37*	0.74**	*0.441*	1.61	*-0.66*	1.86**	*-0.63*
	(0.57)	*(0.66)*	(0.33)	*(0.85)*	(0.97)	*(0.57)*	(0.63)	*(0.71)*
Legislature Strength	0.061***	*-0.021*	0.05***	*0.003*	0.053	*0.33*	0.093	*0.38*
	(0.008)	*(0.15)*	(0.01)	*(0.28)*	(0.08)	*(0.21)*	(0.77)	*(0.21)*
Centralization	-3.75*	*1.81*	-3.71*	*1.78*	-4.05	*1.71*	-3.04	*1.08*
	(1.83)	*(1.06)*	(1.88)	*(1.9)*	(4.71)	*(1.83)*	(3.44)	*(1.31)*
ODA	-0.71	*0.69*	-0.52	*0.871*	-0.41	*0.28*	-1.155	*0.33*
	(0.51)	*(0.83)*	(1.01)	*(1.45)*	(1.91)	*(0.77)*	(1.31)	*(0.89)*
Oil Rents	-0.19**	*0.005*	-0.08**	*0.007*	-0.13	*0.02*	-0.36**	*0.05*
	(0.088)	*(0.065)*	(0.036)	*(0.05)*	(0.076)	*(0.14)*	(0.154)	*(0.23)*

[42] Williams, R. (2006). Generalized Ordered Logit/partial proportional odds models for ordinal dependent variables. Stata Journal, 6(1), 58-82.

Standard errors in parentheses, *, **, and *** imply significance at 10, 5, and 1% respectively. Alternative parameterization: Betas are constant components and Gammas are deviations from proportionality.

6 Discussion and Conclusion

Budget credibility is important both for the attainment of macroeconomic goals and the effective delivery of public services. It also promotes social acceptance of taxation and spending, and contributes to a general strengthening of the power of formal institutions to shape the behavior of individuals. The non-credibility of the budget may have different kinds of impacts. For example, non-credibility of the budget in terms of overall revenue and expenditure will have an impact on a country's fiscal balance, with associated macroeconomic implications. Non-credibility of allocations to high-level votes within the budget may not have macroeconomic implications if overall expenditure levels are adhered to, but it might undermine legitimacy and trust in government if it appears that the government is disregarding the allocative decisions presented by itself and approved by Parliament.

This paper has investigated if fiscal transparency can increase the likelihood of having a credible and reliable budget. Whereas fiscal transparency has become a prominent concern in recent decades, most of the research so far has tended to focus on the linkages between fiscal transparency and fiscal discipline and some other political, institutional, and governance factors. In our analysis, we have found that fiscal transparency also matters for budget credibility, as can be observed by the significant results obtained after using various econometric models. Indeed fiscal transparency increases the likelihood of having high budget execution rates and accurate macroeconomic assumptions. We also show that fiscal transparency, during both the budget formulation and the budget implementation phases, has a positive impact on budget credibility, the impact of fiscal transparency during the formulation phase being slightly higher; furthermore, countries that improve fiscal transparency during the

budget cycle by releasing more information during the implementation phase compared to the formulation phase, are more likely to implement their budgets as intended.

Most governments have made substantial investments in capacity building and technology for the development of financial management information systems (FMIS). While most governments' FMIS are capable of providing useful budget data, an additional effort should be made to publish budget data on dedicated websites, with dynamic links to reliable systems for consistent and timely disclosure of information in easy-to-understand and machine-readable formats. Moreover Year-End reports should be more comprehensive and include information on both projected and actual macroeconomic parameters underlying the budget, and document the reasons behind the deviations from budgeted revenue and expenditure figures.

There are also some concerns in the literature that Ministries of Finance managing public financial management reforms are concentrating on the achievement of aggregate fiscal discipline, to the detriment of sector requirements. Our findings underscore the need to put in place sound control systems to improve the reliability of fiscal data and the integrity of the recording and reporting processes. Overspending against budget totals should require the government to introduce a supplementary budget and enabling budget agencies to exceed annual appropriations should also be subject to restrictions. Besides, given reporting lags in the production of quarterly data, it is often the case that governments have only two observations of in-year budget data before they present their fiscal plans and budgets for the next financial year. This is especially problematic for those countries with fiscal rules that relate past fiscal performance to future fiscal policy setting. As those fiscal rules increasingly apply to the consolidated general government, policymakers need more regular feedback on general government fiscal performance. Publishing provisional data on a monthly basis with a one-month lag would give governments between eight and ten observations before they submit their fiscal plans and budgets to the legislature. While these provisional monthly data will be less detailed, more volatile, and subject to greater revision than quarterly statistical data, they

can help to improve policymakers' and the public's understanding of in-year fiscal developments and patterns.

In addition, most countries' fiscal forecasts are based on a single and often overly ambitious scenario with limited exploration of the implications of alternative assumptions. Improving understanding of the magnitude and likelihood of fiscal risks is critical to safeguarding government's future fiscal solvency. The IMF Fiscal Transparency Code and the OECD's Best Practices for Budget Transparency call on governments to include in their budgets alternative macroeconomic forecast scenarios that can help ensure that fiscal forecasts are credible and fiscal policy settings are robust to a range of macroeconomic outcomes; aligning the methodologies and standards for fiscal forecasting, budgeting, and reporting can also help eliminate unexplained inconsistencies between forecasts and outturns.

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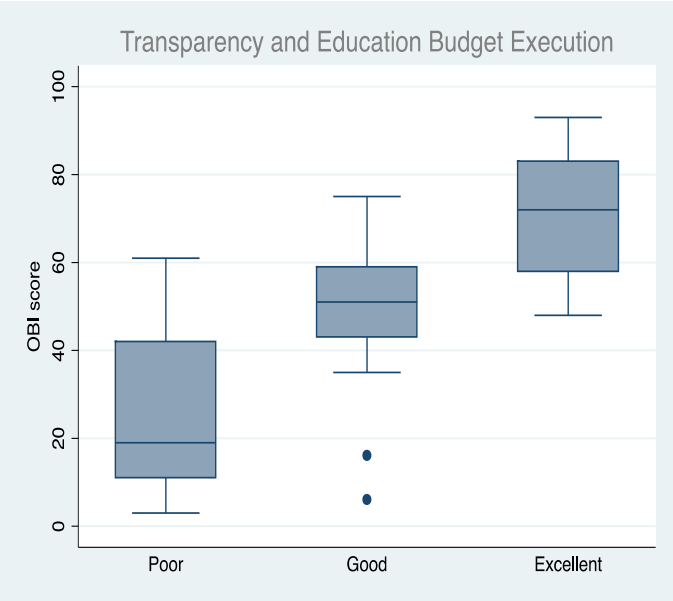
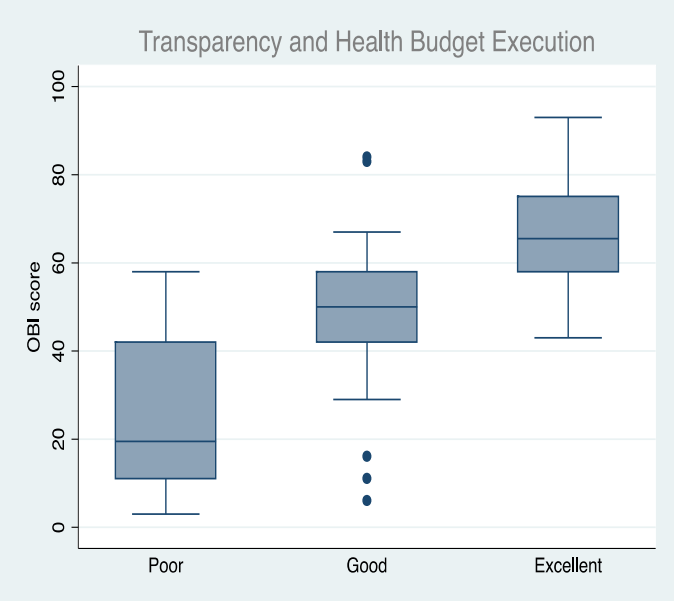
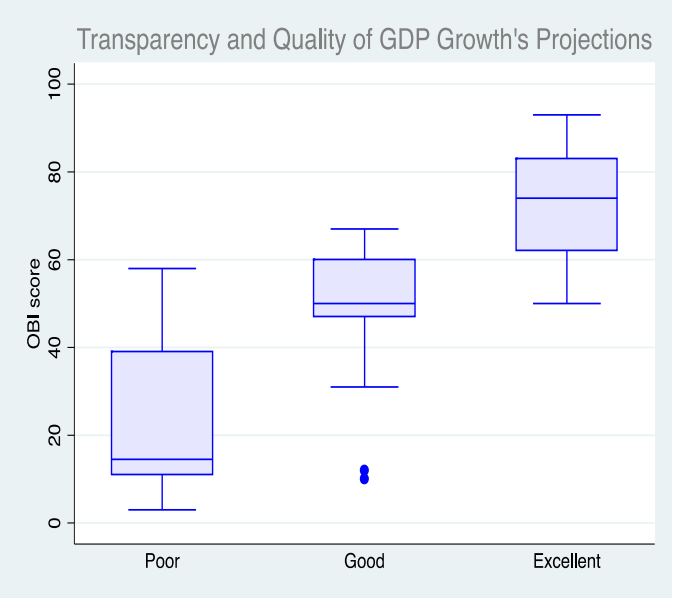
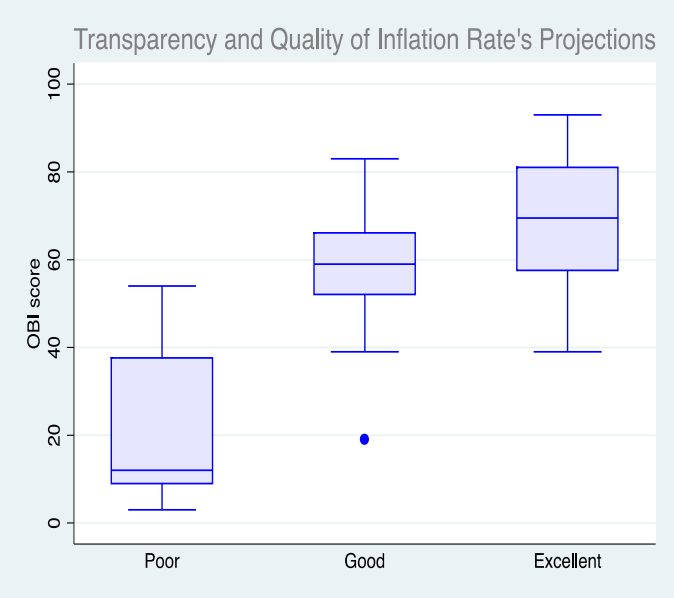
8 Appendices

Appendix A: Description of Variables

Variable	Description	Source
Transparency	Measures the public availability of budget information and the comprehensiveness of budget documents. Scores vary between 0 and 100.	Open Budget Survey
Strength of the Legislature	Measures the strength of the legislature during the budget process. Scores vary between 0 and 100.	
Δ GDP growth	Difference between the projected and the actual GDP growth. Data are in percentage point.	Open Budget Survey, Information compiled from countries' Year-End Reports
Δ Inflation	Difference between the projected and the actual inflation level. Data are in percentage point.	
Δ Education	Difference between the budgeted and the actual expenditures in education. Data are in percentage of budgeted expenditures.	
Δ Health	Difference between the budgeted and the actual expenditures in health. Data are in percentage of budgeted expenditures.	
GDP per capita	Gross Domestic Product divided by midyear population. Data are in constant 2005 U.S. dollars.	World Bank World Development Indicators
Population	Total population counts all residents regardless of legal status or citizenship. Data are in millions of inhabitants.	
ODA	Disbursements of loans made on concessional terms and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries. Data are in percentage of Gross National Income.	
Oil Rents	Difference between the value of crude oil production at world prices and total costs of production. Data are in percentage of GDP.	
Government Effectiveness	Captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures. Scores vary between -2.5 and +2.5.	Worldwide Governance Indicators
Polity 2 score	Indicator of the level of Democracy and Autocracy. Scores vary between -10 and +10.	Polity IV Project
Centralization	Indicator of the level of Centralization of the budget process. Scores vary between 0 and 1.	Database on Political Institutions

Appendix B: Box plots of data on fiscal transparency and budget credibility